WHAT IS CLAIMED IS:

1. A vapor-compression refrigerant cycle comprising:

a compressor for compressing refrigerant, the compressor having a variable displacement;

a high-pressure heat exchanger for cooling high-pressure refrigerant discharged from the compressor;

a decompression unit for decompressing refrigerant from the high-pressure heat exchanger;

a low-pressure heat exchanger for evaporating low-pressure refrigerant after being decompressed in the decompression unit, by performing heat exchange between the low-pressure refrigerant and air passing through the low-pressure heat exchanger;

a first air temperature detector for detecting an air temperature before being heat-exchanged in the low-pressure heat exchanger; and

a second air temperature detector for detecting an air temperature after being heat-exchanged in the low-pressure heat exchanger; and

a control unit for controlling a displacement of the compressor, wherein:

the control unit has a lock determining means for determining a lock of a sliding portion of the compressor; and

the lock determining means determines that the sliding portion of the compressor is locked, when a control signal where the displacement of the compressor is equal to or larger than a predetermined value is output from the control unit,

and when an absolute value of a temperature difference between the air temperature before being heat-exchanged in the low-pressure heat exchanger and the air temperature after being heat-exchanged in the low-pressure heat exchanged is equal to or smaller than a predetermined temperature.

2. The vapor-compression refrigerant cycle according to claim 1, further comprising

a refrigerant pressure detector for detecting a pressure of the high-pressure refrigerant before being decompressed in the decompression unit,

wherein the lock determining means determines that the sliding portion of the compressor is locked, when the control signal where the displacement of the compressor is equal to or larger than the predetermined value is output from the control unit, and when the absolute value of the temperature difference is equal to or smaller than the predetermined temperature, and further when the pressure of the high-pressure refrigerant detected by the refrigerant pressure detector tends to be reduced.

3. The vapor-compression refrigerant cycle according to claim 2, wherein the lock determining means determines that the sliding portion of the compressor is locked, when the control signal where the displacement of the compressor is equal to or larger than the predetermined value is output from the control unit, when the absolute value of the temperature

difference is equal to or smaller than the predetermined temperature, and when the pressure of the high-pressure refrigerant detected by the refrigerant pressure detector tends to be reduced, and further when the air temperature detected by the second air temperature detector tends to be increased.

4. The vapor-compression refrigerant cycle according to claim 3, wherein the lock determining means determines that the sliding portion of the compressor is locked, when the control signal where the displacement of the compressor is equal to or larger than the predetermined value is output from the control unit, when the absolute value of the temperature difference is equal to or smaller than the predetermined temperature, when the pressure of the high-pressure refrigerant detected by the refrigerant pressure detector tends to be reduced, and when the air temperature detected by the second air temperature detector tends to be increased, and further when an absolute value of a temperature difference between a target temperature of air after being heat-exchanged in the low-pressure heat exchanger and the air temperature detected by the second air temperature detector is larger than a set value.

5. The vapor-compression refrigerant cycle according to claim 1, wherein the control unit controls an electrical control value applied to the compressor so as to control the

displacement of the compressor.

6. A lock detection device for detecting a lock of a sliding portion of a variable displacement compressor for a refrigerant cycle having a high-pressure heat exchanger for cooling high-pressure refrigerant discharged from the compressor and a low-pressure heat exchanger for evaporating low-pressure refrigerant after being decompressed by performing heat exchange between the low-pressure refrigerant and air passing through the low-pressure heat exchanger, the lock detection device comprising:

a first air temperature detector for detecting an air temperature before being heat-exchanged in the low-pressure heat exchanger; and

a second air temperature detector for detecting an air temperature after being heat exchanged in the low-pressure heat exchanger; and

lock determining means for determining a lock of the sliding portion of the compressor,

wherein the lock determining means determines that the sliding portion of the compressor is locked, when a control signal where the displacement of the compressor is equal to or larger than a predetermined value is output from a control unit for controlling a displacement of the compressor, and when an absolute value of a temperature difference between the air temperature before being heat-exchanged in the low-pressure heat exchanger and the air temperature after being

heat-exchanged in the low-pressure heat exchanged is equal to or smaller than a predetermined temperature.

7. The lock detection device according to claim 6, further comprising

a refrigerant pressure detector for detecting a pressure of the high-pressure refrigerant before being decompressed in the decompression unit,

wherein the lock determining means determines that the sliding portion of the compressor is locked, when the control signal where the displacement of the compressor is equal to or larger than the predetermined value is output from the control unit, and when the absolute value of the temperature difference is equal to or smaller than the predetermined temperature, and further when the pressure of the high-pressure refrigerant detected by the refrigerant pressure detector tends to be reduced.

8. The lock detection device according to claim 7, wherein the lock determining means determines that the sliding portion of the compressor is locked, when the control signal where the displacement of the compressor is equal to or larger than the predetermined value is output from the control unit, when the absolute value of the temperature difference is equal to or smaller than the predetermined temperature, and when the pressure of the high-pressure refrigerant detected by the refrigerant pressure detector tends to be reduced, and further

when the air temperature detected by the second air temperature detector tends to be increased.

9. The lock detection device according to claim 8, wherein the lock determining means determines that the sliding portion of the compressor is locked, when the control signal where the displacement of the compressor is equal to or larger than the predetermined value is output from the control unit, when the absolute value of the temperature difference is equal to or smaller than the predetermined temperature, when the pressure of the high-pressure refrigerant detected by the refrigerant pressure detector tends to be reduced, and when the air temperature detected by the second air temperature detector tends to be increased, and further when an absolute value of a temperature difference between a target temperature of air after being heat-exchanged in the low-pressure heat exchanger and the air temperature detected by the second air temperature detector is larger than a set value.